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ENVIRONMENTAL RESTORATION
DIVISION DMC

SITE HEALTH & SAFETY PLAN

FOR

**ORGDP SEAWOLF DRILLING PROJECT
Building K-1401**

FINAL

April 2, 1990

This document has been approved for release
to the public by:

Steven D. Zient 9/19/95
Technical Information Officer Date
Oak Ridge K-25 Site

Prepared by:

ERC ENVIRONMENTAL AND SERVICES CO., INC.

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The Oak Ridge K-25 Site is managed by
Martin Marietta Energy Systems, Inc.
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contract DE-AC05-84OR21400.

SITE HEALTH AND SAFETY PLAN
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1.0 INTRODUCTION

1.1 SCOPE AND APPLICABILITY

This document is the Site Health and Safety Plan (SHSP) for the ORGDP SEAWOLF DRILLING PROJECT, K-1401 being undertaken by ERC/Edge Group under subcontract to Martin Marietta Energy Systems (MMES). The purpose of this document is to establish standard health and safety procedures for ERC/Edge employees on this project, and for protection of ORGDP personnel affected by this project's activities.

The levels of protection and the procedures specified in this plan are based on the best information available from reference documents and site characterization data, and represent the minimum health and safety requirements to be observed by all ERC/Edge personnel while engaged in this project. Unforeseeable site conditions or changes in scope of work may warrant a reassessment of protection levels and controls stated.

Employees must read this document carefully. If you have any questions or concerns which you feel are not adequately addressed, ask the Health and Safety Officer. Follow the designated health and safety procedures, be alert to the hazards associated with working on any construction site in close proximity to heavy equipment, and above all else, use common sense, and exercise reasonable caution at all times.

1.2 REFERENCES

During development of this plan consideration was given to current safety standards as defined by OSHA/NIOSH, EPA health effects and standards for known contaminants, and procedures designed to account for the potential for exposure to unknown substances. Specifically, the following reference sources have been consulted:

- * OSHA 29 CFR 1910.120, 29 CFR 1910 & 1926 and EPA 40 CFR
- * OSHA/NIOSH/EPA/Coast Guard "Occupational Health and Safety Guidelines for Activities at Hazardous Waste Sites"
- * NIOSH Pocket Guide to Chemical Hazards
- * (ACGIH) Threshold Limit Values 1989-90
- * Site Characterization data from RCRA Facility Investigation Plan, K-1401 Acid Line, ORGDP, March 1988

1.3 VISITORS

All visitors to the contamination reduction zone and exclusion zone at the SITE will be required to read and verify compliance with the provisions of this SHSP. In addition, visitors will be expected to comply with relevant OSHA requirements such as medical monitoring, training, and respiratory protection. Visitors will also be expected to provide their own protective equipment.

In the event that a visitor does not adhere to the provisions of the SHSP, he/she will be required to leave the work area. All nonconformance incidents will be recorded in the site log.

2.0 SITE DESCRIPTION

The Department of Energy, Oak Ridge Gaseous Diffusion Plant (ORGDP) is operated by Martin Marietta Energy Systems Inc., (MMES) and is located in Oak Ridge, Tennessee. Among the extensive support facilities at ORGDP is Building K-1401 maintenance facility. Cleaning operations performed in Building K-1401 included the use of solvent degreasers and corrosives. Cleaning solutions and wastes were transferred in a pipeline which has been determined to be leaking and will be reviewed under Section 5.0 "Hazard Evaluation".

3.0 ENTRY OBJECTIVES

Three exploratory borings are planned within Building K-1401, in order to obtain subsurface data in an area proposed for a portion of the Seawolf Project. Prior to the onset of drilling activities, ERCE will remove the 10" diameter concrete core plug. Exploration will be done with a truck mounted rig using hollow stem augers. Anticipated exploration will consist of standard penetration tests (ASTM D 1586) on two and one-half foot centers. In addition, we plan on obtaining undisturbed soil samples in three-inch diameter, thin-walled metal tubes in accordance with ASTM D 1587. In addition, depending upon the refusal depth, it may be necessary to core the bedrock in accordance with ASTM D 2116.

--- The purpose of this investigation is to obtain subsurface data thereby allowing an evaluation of subsurface conditions. This information will be used to develop recommendations for the design of a foundation system for the Seawolf machinery.

3.1 ANTICIPATED PERSONNEL

Driller - Operate the drill to obtain subsurface data
Helper - Assist the driller
Site Health and Safety Officer - Implementation of Site Health and Safety Plan
Environmental Samplers (5) - collect soil and water samples

4.0 ONSITE ORGANIZATION AND COORDINATION

The following personnel are designated to carry out the stated job functions on site.

Job function	Name	Phone Number
MMES Project Engineer	Thomas J. McLaughlin	574-9249
MMES Construction Engineer	Mark Shedden	574-0007
MMES Security	Spence Echols	574-8342
MMES Fire Department	Chief Hope	574-8323
MMES Plant Shift Superintendent	On-Duty	574-3282
MMES Health Physics	Bobby Oliver	576-5551
MMES Industrial Hygiene	Ted Helms/Bill Everett	574-8622
MMES Industrial Safety	Ridley Ray	574-8579
MMES Medical	On-Duty	574-8562
MMES Waste Management	David Coleman	574-8214
ERC/Edge Project Manager	Larry Benson	966-9788
ERC Health & Safety Manager	Mike Palmer	481-8002
ERC/Edge Site Health & Safety Officer	Harlan Faulk	481-8002

All personnel entering or leaving the site will log in and out with the site safety and health officer. All activities on site must be cleared through the ERC/Edge Project Manager and ERC/Edge Health and Safety Manager.

4.1 SITE HEALTH AND SAFETY OFFICER ROLE

The SHSO is specifically given the authority for the following actions:

- (1) Coordinate site access and deny personnel access to each site or any portion of a site until proper site briefing has been conducted and health and safety training documented.

- (2) Perform full time monitoring/sampling of site hazards for exposure evaluation to workers.
- (3) Ensuring that personnel receive this plan and are aware of its provisions, are instructed in safe work practices, and are familiar with potential hazards and planned emergency procedures, prior to initiation of respective site activities.
- (4) Confirming that personnel working on-site have the proper medical surveillance program and health safety training that qualifies them to work at a hazardous waste site. Also the SHSO is responsible for identifying all site personnel with special medical conditions (i.e., allergies, pregnancy, diabetes).
- (5) Direct all personnel to obtain immediate medical attention when required.
- (6) Establishing site work zones and level of protection required.
- (7) Ensuring that site workers have been properly trained and fit tested for respirator protection.
- (8) Minimizing the number of personnel and amount of equipment in the exclusion zone, but only to the extent consistent with safe site operations.
- (9) Identifying key plant personnel (and alternates) who are responsible for specific safety-related areas, such as medical, plant safety, health physics, and industrial hygiene; establishing liaison with plant security, fire protection, and the shift superintendent's organization to facilitate emergency response.
- (10) Establishing and posting at the site an emergency notification plan, telephone numbers, and directions to the telephone nearest to the site.
- (11) In the event that an unforeseen safety-related condition or hazard becomes evident during investigation, ordering operations to cease, safeguarding personnel, and reestablishing safe working conditions.

- (12) Calibrating all monitoring equipment that will be used on a daily basis and recording results on the daily instrument calibration log. Instrumentation shall be capable of detecting radiation in dpm/100cm².
- (13) Ensuring that all monitoring equipment is operating correctly according to this health and safety plan and/or the manufacturer's instructions and providing maintenance if authorized.
- (14) Implementing health and safety plans, reporting to the site project manager for action if there are any deviations from the anticipated conditions described in the plan, and authorizing the cessation of work if necessary.
- (15) Ensuring that personnel stay out from under overhead work and temporarily suspended or moving equipment.
- (16) Ensuring that personnel are frisked during egress from the contamination area.

The Site Health and Safety Officer (SHSO) has total responsibility for ensuring that provisions of this SHSP are adequate and implemented in the field. Changing field conditions may require decisions to be made concerning adequate protection programs.

4.2 PROJECT PERSONNEL ROLE

Project personnel involved in on-site investigations and operations are responsible for:

- (1) Taking all reasonable precautions to prevent injury to themselves and to their fellow employees; being alert to potentially harmful situations.
- (2) Performing only those tasks that they believe they can do safely and immediately reporting any accidents and/or unsafe conditions to the SHSO and the site project manager.
- (3) Notifying the site project manager and the SHSO of any special medical conditions (i.e., allergies, pregnancy, diabetes) and, if necessary, ensuring that all on-site personnel are aware of any such conditions.
- (4) Preventing spillage to the extent possible. In the event that a spillage occurs.

- (5) Avoiding splashing of contaminated materials to the extent possible.
- (6) Practicing good housekeeping by keeping everything orderly and out of potentially harmful situations.
- (7) Reporting all injuries.
- (8) Abiding by the buddy system so that each on-site worker is responsible for keeping track of their partner.

5.0 HAZARD EVALUATION

5.1 OVERALL HAZARD LEVEL

Overall hazard level from radioactivity and chemical contamination posed by activities is low. Radiation and volatile organic compound monitoring will be performed to identify the potential radiological and chemical exposure hazards posed by planned activities.

5.2 CHEMICAL HAZARDS

RE: RCRA Facility Investigation Plan, K-1401 Acid Line, 3/88.

5.2.1 Operational Information

The primary chemical hazards of concern are leaching chemical contaminants from the K-1401 acid line located on the east side of Building K-1401. The 10-inch acid line is constructed of vitrified clay pipe and is approximately 1500 feet in length. Various cleaning solutions were discharged through the Building K-1401 acid line. The line was found to be leaking in 1975 and in 1987 and control measures were implemented to prevent further intrusion of leaking contaminants into the substrate. The acid line has been placed out of service until the pipe can be replaced. Other potential sources of chemical hazards from chemical storage tanks, process lines, sumps and drain lines were not indicated as areas of exposure hazard concern for activities to be conducted on this project.

5.2.2

Characterization of Chemical Contaminants

Detailed records on the quantities and chemicals that flowed through the process drain line at this site are not available. A summary of the possible contaminants as indicated by past RCRA research documents and verbal discussions with MMES project representatives is listed below.

- | | |
|------------------------|-----------------|
| - carbon tetrachloride | - sulfuric acid |
| - trichloroethane | - chromic acid |
| - trichloroethylene | - sulfamic acid |
| - hydrochloric acid | - Diversey |
| - acetone | - methyl ethyl |
| - freon | - ketone |
| - paint shop waste | - aromatic |
| - epoxies | - hydrocarbons |
| - mercury | - cutting oils |

It can be speculated that any of the above chemical contaminants has leaked from process drain lines systems into the soil and groundwater. The chemical hazard properties presented by this array of chemicals may produce acute (short term) health effects and/or chronic (long term) health effects. These chemicals also include chemicals possessing physical hazards of flammability and reactivity.

Corrosives (acids & caustics) exposure symptoms primarily include acute irritation to skin, eyes and respiratory system. The degree of the health effect from exposure to corrosives depends upon the Ph of the chemical and concentration of chemical contacted. Degreasing agent contaminants (carbon tetrachloride, trichloroethylene and trichloroethane) symptoms of acute exposure are skin, eye and respiratory irritation and may manifest into visual disturbances, headache, fatigue, nausea, mental confusion and incoordination, dependent upon concentration. There is damage to liver and other target organs from chronic exposure. It is important to note that most of the degreasing solvents identified can be

incompatible and reactive with the acids and caustics identified.

5.3 PHYSICAL HAZARDS

The degreasing solvents identified range from extremely flammable liquids (flash point $<73^{\circ}\text{F}$) to combustible liquids (flash point $> 100^{\circ}\text{F}$). Some of these same solvents may also generate extremely toxic and corrosive decomposition products when exposed to a high heat source or incompatible material.

5.4 CHARACTERISTICS OF SUSPECTED CONTAMINANTS

Chemical Name	TLV/PEL	STEL/ IDLH	Target Organs/ Symptoms/ Misc. Info.	Physical Description	Chemical/ Physical Properties
Acetone	TLV:750 ppm	1000/ 20,000	eyes, nose, throat/dermatitis	colorless liquid, with mintlike odor	LEL:2.6% very flammable
Carbon Tetra-chloride	TLV:5 ppm PEL:10 ppm		Suspect carcinogen narcotic, respiratory eyes and skin irritation	colorless liquid, ether like odor	Non-combustible, insoluble
Chromic Acid Chromium Trioxide	TLV: $\frac{1}{3}$ 05 mg/m ³ PEL (c):1mg/ 10m ³	IDHL: 30mg/m ³	Carcinogen, corrosive to skin, eyes, respiratory tract	Red color, crystalline	oxidizer, fire hazard
Freon 113 (1,1,2-Trichloro-1,2,2-trifluoroethane)	TLV:1000 ppm	IDLH:4500 ppm	eye, skin, heart, throat/irrit,derm, drow, irrit decomposition products	colorless liquid with odor like carbon tetra-chloride (at high conc)	Sol:0.02% not combustible
Hydro-chloric acid	TLV:c 5ppm	IDLH:100 ppm	very irritating to skin, eyes, respiratory tract	colorless gas, with irritating pungent odor	not combustible soluble
Mercury	TLV (org): 0.01 mg/m ³	STEL (alkyl): 0.03 mg/m ³	CNS, kidney resp, liver/tremors, cough, liquid	inorganic=silvery odorless	Sol:0.002% not combustible
inorganic: mercury	TLV:0.1 mg/m ³ TLV vapor: 0.05 ₃ mg/m ³	IDHL (inorg): ₃ 28 mg/m ³ IDLH (organ): 10 mg/m ³	CNS, kidney, resp, liver/tremors cough, liquid	inorganic=silvery, odorless	Sol:0.002% not combustible
methylethyl ketone	TLV:200 ppm	STEL 300 ppm	Narcosis, headache, irritation eyes, mucus membrane	colorless liquid fruity odor	flammable liquid

5.4 CHARACTERISTICS OF SUSPECTED CONTAMINANTS

Chemical Name	TLV/PEL	STEL/ IDLH	Target Organs/ Symptoms/ Misc. Info.	Physical Description	Chemical/ Physical Properties
sulfuric acid	TLV: $1\text{mg}/\text{m}^3$	STEL: $3\text{mg}/\text{m}^3$ IDLH: $80\text{mg}/\text{m}^3$	Irritation to eyes, nose, throat. Pulmonary edema molting teeth	colorless liquid fruity odor	flammable liquid
1,1,1-Tri-chloro-ethane (methyl chloroform) 350 ppm (PEL)	450 ppm (STEL) 1000 ppm (IDLH)	Skin, eyes, CVS, CNS	Colorless liquid, chloroform odor	Sol. = 0.07%; odor similar to chloroform	
Trichloro-ethylene (TCE)	50 ppm (TLV)	200 ppm (STEL)	Respiratory system, heart, liver, kidneys, CNS, skin	Colorless liquid chloroform odor	LEL = 11% Sol. = 0.1%; strong caustic

5.5 RADIOACTIVITY

According to discussions with MMES Health Physics Department, health physics surveys of the work area location reveal uranium contamination. The radioactive contamination was primarily identified as fixed contamination in the concrete floor, although smear samples have indicated loose contamination on the floor surface, which may become airborne when disturbed by work activities. The work area within the building is located within a "Regulated Area" for control of radioactive contamination.

Expected radioactive exposure level for workers on this project is well below the radiation exposure criteria for ORGDP given by DOE Order 5480.11. Specifically, it is projected that the total individual radiation exposure will be well below the (DOE and NCRP) criterion of 100 mrem/year. Continuous field radiation monitoring of drilling activities will be performed by the SHSO to assess ambient levels in the work area. Reference 8.3. Equipment used onsite is required to be checked by MMES Health Physics prior to site access.

5.6 OPERATIONAL HAZARDS

Prior to commencement of drilling activities a site reconnaissance will be performed by the MMES Construction Engineer and ERC/EDGE SHSO to identify any visible hazards such as overhead/underground utilities, or operational hazards created from building work activities. Typical construction site hazards will exist and personnel will be working in potentially uneven or unstable work areas. Dust generated from drilling activities shall be controlled.

Drill Rig shall be operated by an experienced, qualified operator and shall be located and operated in a safe manner. When the drill rig is within the confines of a work location which is adjacent to overhead energized lines, it shall be grounded with a trailing insulated No. 4/0 cable connected to an effective electrical ground and to the frame of the equipment. MMES will provide a clearance check for underground utility lines via a penetration/excavation permit system.

All tools and equipment used on this project shall be inspected and maintained to be safe and adequate for the purpose for which designed. All temporary 120/125-volt, single-phase, 15 and 20-ampere receptacles and cord sets shall be protected by approved ground fault circuit interrupters (GFCIs).

Exhaust fumes from the gasoline powered drill rig may present a carbon monoxide gas exposure to workers on the project, as well as, MMES personnel within the adjacent building areas. Building exhaust fans and the overhead bay door will be utilized as a control measure to ventilate lingering exhaust. Continuous monitoring for carbon monoxide will be performed by the SHSO to assess effectiveness of control measures. An additional measure will be for a non-combustible trunk line to be attached to the rig exhaust pipe to redirect the exhaust outside the building to a safe location. The location for redirection of the exhaust shall be pre-designated by the MMES Construction Engineer and the ERC/EDGE SHSO. Action Level of 1/2 of the PEL for carbon monoxide and a STEL of 200 ppm for carbon monoxide will be utilized by the SHSO for evaluation of ambient levels.

Operation of the drill rig inside the confines of a structure may present a noise hazard exposure to workers and MMES personnel in the adjacent building areas. The SHSO will continuously monitor work area noise levels and post areas requiring the use of hearing protection, pursuant with OSHA 29 CFR 1910.95, 1926.52.

5.7 FIRE PROTECTION

A 20lb ABC type portable fire extinguisher shall be readily available on the site and personnel trained in its use. Personnel shall be familiar with instructions on how to summon for emergency assistance. All drilling operations will be monitored by a combustible gas meter to detect the introduction of flammable vapors present within one-foot of the auger. No smoking, open flames, or other ignition sources shall be allowed within 50 feet of the boring operations when flammable vapors are indicated as being present.

All flammable liquids and solvents shall be transported and stored in UL listed and FM approved safety containers. Proper grounding, bonding and venting precautions shall be adhered to when dispensing flammable or combustible liquids, as well as precautions to prevent and contain any spillage.

6.0 HAZARD COMMUNICATION

--- In accordance with 29 CFR 1910.1200, OSHA Hazard Communication Standard, Material Safety Data Sheets are provided for the following chemicals to be encountered onsite: MSDS will be reviewed with workers by the SHSO.

MMES	ERC/Edge
Carbon tetrachloride	Gasoline
trichloroethane	Diesel fuel
trichloroethylene	Lubricant oils
hydrochloric acid	WD 40
acetone	Isopropyl alcohol
freon	
mercury	
sulfuric acid	
chromic acid	
sulfamic acid	
Diversey	
methyl ethyl ketone	
epoxies	
cutting oils	

7.0 SITE WORK ZONES

The SHSO will coordinate access control and security on the site. A safe perimeter will be on the site. A safe perimeter will be established around areas where work is in progress, and will be bordered by a roped off and/or flagged area. Signs will be posted reading "Authorized Personnel Only" at all possible site access points. Additional zones and signs may be required depending on monitoring results. The roped/flagged area, will be designated as Exclusion Zone, based on onsite conditioning and monitoring results.

7.1 EXCLUSION ZONE

The exclusion zone is the area where the potential of coming into contact with contamination is greatest. All personnel entering the exclusion zone will have the prescribed level of protective clothing as determined by the SHSO. Modified Level D protective clothing will be adequate to safeguard personnel at the drill site until the unlikely event that continuous monitoring proves otherwise. In this event the level of protection would be upgraded to the level that would be necessary to safeguard personnel. An entry and exit checkpoint will be defined at the periphery of the exclusion zone to regulate the flow of personnel and equipment into and out of the zone.

Prohibited items or conduct in the exclusion zone include:

- Beards and long sideburns;
- Eating, drinking, smoking, chewing or any other activity which could lead to the possibility of hand to mouth exposure from contaminants.
- Personal articles, e.g., watches and rings;
- Working when ill;
- Complete removal of respiratory protective equipment under Level C or higher protection;
- Access to the exclusion zone by any individual not having the required health and safety training in accordance with 29 CFR 1910.120s(e), March 6, 1990.

7.2 CONTAMINATION REDUCTION ZONE

The Contamination reduction zone is established outside the exclusion zone. This zone provides a transition between the exclusion zone (potentially contaminated zone) and the support zone (clean zone). It serves as a buffer to reduce the possibility of the support zone becoming contaminated, and it provides additional assurance that the physical transfer of contaminating substances on personnel and equipment or in the air is limited through a combination of decontamination, distance between exclusion and support zones, air dilution, zone restrictions, and work functions. Items and/or conduct prohibited in the exclusion zone are also prohibited in the contamination reduction zone. At the boundary between the exclusion and the contamination reduction zones, decontamination stations for the sole purpose of personnel decontamination will be established. No individual shall exit the contamination reduction zone prior to personal health physics screening except in the event of an on-site emergency and as approved by the site project manager or SHSO.

7.3 SUPPORT ZONE

The support zone shall be marked and protected against contamination from the work site. Primary functions of the support zone are:

- The entry area for personnel, material, and equipment.
- The exit area for decontaminated personnel, materials, and equipment.
- A storage area for clean safety and work equipment.
- An area for rest breaks, the consumption of food and beverage, after washing of hands and face.

8.0 PERSONAL PROTECTIVE EQUIPMENT EXCLUSION ZONE REQUIREMENTS

All workers within the exclusion zone at the drilling site will require personal protection at Modified Level D with a contingency for upgrading to Level C should it be deemed necessary by the SHSO based upon on-site air monitoring data. A summation of Modified Level D and Level C personal protection is as follows:

NOTE: Any dust producing activities will require a half or full face, air-purifying respirator fitted with combination cartridges, regardless of site air monitoring data.

- Modified Level D Protection

Same as D except:

- a. Work shirt and long pants
- b. Work gloves
- c. Hard hat
- d. Safety glasses or goggles, face shield for splash hazard
- e. Steel-toe shoes
- f. Tyvek suit
- g. Boot covers
- h. Chemical resistant gloves, if required
- i. Hearing Protection

- Level C Protection

- a. Full-face piece, air-purifying respirator fitted with combination chemical vapor/dust cartridges
- b. Full length tyvek coveralls
- c. Two layers chemical resistant gloves
- d. Steel-toe shoes
- e. Shoe covers
- f. Hard hat
- g. Safety goggles or glasses

All respiratory equipment will be approved by the National Institute for Occupational Safety and Health (NIOSH), Mine Safety and Health Administration (MSHA). All personnel required to use respiratory protection shall have had an up-to-date quantitative respirator fit test and will wear only those respirators approved by the quantitative fit test. In addition, all personnel will abide by a single-use respirator policy. Once the seal of the respirator has been broken (i.e., for lunch and other breaks), a new respirator will be donned in place of the previous respirator.

Hearing protection shall be furnished and worn by personnel whenever the noise level from drilling activities exceeds 85 decibels (dB) on the A-weighted scale.

8.1 PROTECTIVE CLOTHING DONNING PROCEDURES

The purpose of the protective clothing donning procedures is to ensure that on-site personnel are instructed in the proper way to don protective clothing. Failure to adhere to these procedures may result in the protective clothing being ineffective against a potential contaminant. The following donning procedures are given as a guide and may be altered by the SHSO if improvements can be made to the procedure and these changes are warranted in the field. In addition, some articles of protective clothing/equipment detailed below may not be necessary for the particular site task.

- (1) Inspect clothing and respiratory equipment before donning.
- (2) Don outer chemical resistant (Tyvek) suit.
- (3) Place boot covers over the feet of the suit if required. Tape the boot covers to the leg of the suit, providing a seal, and tab the tape to permit removal.
- (4) Don the respirator after performing the initial qualitative checks of the respirator's integrity (Level C).
- (5) Draw hood up around the respirator. Seal exposed facial areas between the suit and the respirator with duct tape. (Level C)
- (6) Don both pairs of chemical-resistant gloves; insert sleeve of suit inside glove and seal to the suit with tape. A tab should be provided on the tape to ease removal of gloves during contamination procedures.
- (7) Adjust hard hat to fit head.

8.2 PROTECTIVE CLOTHING DOFFING PROCEDURES

The purpose of the protective clothing doffing procedures is to ensure that all on-site personnel are instructed in the proper fashion for the removal of protective

equipment. Failure to adhere to these procedures may result in unnecessary exposure to a potential on-site contaminant. The following doffing procedures are given as a guide and may be altered by the SHSO if improvements can be made to the procedure and these changes are warranted in the field. In addition, some protective equipment/clothing listed below may not be required for a specific site task.

- (1) Remove any extraneous disposable clothing/equipment (i.e, outer gloves, hard hat, boot covers, and tape). Dispose of in the appropriate receptacle.
- (2) Unzip protective suit.
- (3) Remove one arm from the suit at a time, turning the suit inside out. Inner gloves should still be worn at this time.
- (4) Sitting, if possible, remove one leg from the suit at a time, turning the suit inside out.
- (5) Dispose of the suit in the appropriate receptacle.
- (6) Remove respiratory equipment. (Level C only)
- (7) Remove inner disposable gloves by rolling them off each hand inside out and dispose of it in the appropriate receptacle.

9.0 PERSONAL PROTECTION UPGRADE ACTIONS

Modified Level D personal protection will be upgraded to Level C if at any time during drilling operations organic vapor levels in the breathing zone exceed 5 ppm above background conditions for more than five minutes. Contact MMES Construction Engineer in this instance. Once the level of protection has been upgraded from Modified Level D to Level C, Level C protection will be required until the hole is completed or the source of the vapors has been cased off and the concentration of organic vapors in the breathing zone remains less than 1 ppm above background conditions for more than 10 minutes.

Level C personal protection will require that all workers within the exclusion zone wear a full layer of chemical resistant, disposable clothing along with an air-purifying respirator offering protection against vapors, gases, dusts, fumes and mist. Respirator cartridges will be disposed after each use and respirators disinfected and checked prior to reuse.

9.1 INHALATION EXPOSURE LIMITS

Under circumstances where monitoring instruments show organic vapor concentrations near the upper limit for Level C personal protection, the SHSO will immediately terminate all work and direct workers to a safe area, upwind of the work area. The SHSO will not allow workers to return to drilling area until the concentration of vapors returns to levels acceptable to Level C protection. Should the concentration of vapors in the breathing zone not return to acceptable levels within 1/2 hour, the SHSO will contact the MMES Construction Engineer, Project Manager and Health and Safety Manager for further direction.

9.2 RADIATION EXPOSURE LIMITS

The responsibility for limiting the exposure of workers to non-hazardous levels of radiation will be jointly shared by the SHSO and MMES. The SHSO will continuously monitor for radiation in the drill cuttings with a portable radiation detector instrument. Should the reading exceed $>3000 \text{ dpm}/100 \text{ cm}^2$ above background for beta-gamma activity the SHSO will order work to be stopped and the crew removed from the exclusion zone. The SHSO will notify the MMES Construction Engineer of the reading and request Health Physics to assess the potential hazard of the conditions and determine whether or not work should continue.

10.0 SITE MONITORING

Periodic monitoring of the site is required to determine the effectiveness of engineering controls, to re-evaluate levels of protection, and determine if site conditions have changed. At a minimum, monitoring will be conducted:

- (1) The beginning of each shift
- (2) Every 5 feet
- (3) Every 15 minutes throughout the work
- (4) Whenever work begins at a new area onsite
- (5) When different contaminants are encountered, or
- (6) A different work activity begins.

The results of the monitoring will be documented and MMES will be consulted with to develop methods to eliminate any exposure problem that does exist.

Instrumentation will be used only by the SHSO who has had prior experience and training with regard to instrument care, calibration and operation.

- Foxboro-Century Organic Vapor Analyzer (OVA 128 w/o GC) - The range of the instrument is .1 to 10,000 ppm. Detects the total concentration of many organic gases and vapors.
- MSA Combustible Gas/Oxygen meter/Carbon Monoxide - Simultaneously measures the percentage of combustible gases and vapors, and percentage of oxygen in the atmosphere, and carbon monoxide.
- Direct Reading Colorimetric Indicator Tube and Manual Hand Pump. Draeger - Measures concentrations of specific gases and vapors.
- Portable Beta Gamma Radiation Counter - Detecting radiation greater than background.
- Sound Level Meter

11.0 FIELD PERSONNEL HEALTH & SAFETY TRAINING

Prior to site access each individual will be required to document successful completion of a 40-hour health and safety training course as required by 29 CFR 1910.120 regulation governing Hazardous Waste Operations and Emergency Response. Additionally, prior to site entry each individual will be required to attend a site specific health and safety briefing by the SHSO to instruct personnel to recognize the hazards on-site, the provisions of this SHSP, and the responsible personnel. Furthermore, this site will require an on-site health and safety orientation by MMES health physics, industrial hygiene, safety and security personnel, to be coordinated by the MMES Construction Engineer. Periodic tool box talk type meetings conducted by the SHSO on safety and health topics directly relevant to on-site work activities.

12.0 MEDICAL MONITORING

All personnel engaged in work on this project must have completed a baseline physical examination for medical monitoring (29 CFR 1910.120) and be cleared by a physician for work in hazardous waste operations and fit to wear a respirator. If the SHSO suspects that an individual has been exposed to level exceeding what is permissible, he will notify the MMES Construction Engineer and request that a medical exam be conducted on the individual to determine the impact of overexposure.

13.0 EMERGENCY MEDICAL TREATMENT AND FIRST AID

At least one person currently Red Cross certified in both first aid and CPR will be present during field activities within the exclusion zone. Life support techniques and treatment of life threatening problems, such as bleeding, airway obstruction, and shock shall be given top priority, with emergency medical response personnel providing extended emergency care (see Table D).

During a medical emergency the SHSO is responsible to:

- Prevent further injury, perform appropriate decontamination, and notify the Project Manager and MMES project representative
- Initiate first aid and get medical attention for the injured immediately (ORGDP emergency squad)
- Prepare an incident report. The SHSO is responsible for preparing and submitting the report to the ORGDP representative within 48 hours (see Table D).

14.0 SANITATION

Restrooms will be designated in Building K-1401 for use on this project.

15.0 COMMUNICATIONS

The "buddy system" will be enforced for field activities involving potential exposure to hazardous, toxic or radioactive materials, and during any work within the exclusion zone. Each person will observe their partner for symptoms of chemical overexposures or heat stress and provide emergency assistance when warranted.

Emergency Signals: The following emergency signals shall be used:

- | | |
|-----------------------------|---------------------|
| • Grasping throat with hand | Emergency - help me |
| • Thumbs up | OK; understood |
| • Grasping buddy's wrist | Leave site now |

16.0 DECONTAMINATION PROCEDURES

--- The purpose of decontamination is primarily to limit the spread of contaminated materials from the exclusion zone. This is accomplished through a step-by-step procedure whereby the protective clothing and equipment are washed or disposed of. The decontamination procedures presented herein for

Modified Level D and Level C are very similar differing in that extra stations are present in Level C decontamination to account for additional layer of dress-out and respiratory protection. The SHSO will establish specific set-up of a contamination reduction zone. Monitoring during drilling may indicate the need for additional stations under certain conditions. Allowances must be made for the type of protective equipment being worn, e.g., non-disposable, steel toe shoes need not be removed if properly decontaminated.

16.1 PERSONNEL DECONTAMINATION

Clothing and exposed skin surfaces shall be monitored with a GM pancake probe. Special emphasis should be given to hands, shoes, and the cuffs of pants. All removable contamination shall be removed. Fixed contamination should be reduced as much as reasonable possible, however, care shall be taken not to irritate or abrade the skin. Fixed contamination reading in excess of 3000 dpm/100 cm² shall warrant notification of MMES Health Physics for further actions.

AND PLANT SHIFT SUPERINTENDENT

16.2 EQUIPMENT DECONTAMINATION

The SHSO will be responsible to ensure that all equipment is properly decontaminated and checked by MMES Health Physics prior to coming offsite. Reasonable efforts should be made to remove contamination by wiping, brushing or washing surfaces with rinsates contained and collected for proper disposal. The release of equipment and vehicles will be based on DOE Order 5480.11.

RECOMMENDED MAXIMUM CONTAMINATION GUIDES FOR UNRESTRICTED RELEASE OF EQUIPMENT OR MATERIALS

<u>Direct Survey</u>			<u>Transferable (Smear) Survey</u>		
Alpha	Beta	Gamma	Alpha	Beta	Gamma
DPM/100cm ²			DPM/100cm ²		
<5,000	<5,000		<1,000	<1,000	

These criteria for surface contamination will also be used for assessing surface contamination of monitoring equipment, boots and clothing.

At a minimum, all visual indication of contamination will be removed and no organic vapors detectable above background should remain. Equipment should be reasonably clean, dry, unstained, free from deposits, encrustations, or discoloration.

16.3 MODIFIED LEVEL D DECONTAMINATION

EXCLUSION ZONE

Equipment: 6 ml plastic rolls

SEGREGATED EQUIPMENT DROP

Remove mud and substrate from equipment to reduce spread of possible contamination. Deposit Drilling tools and heavy equipment used in exclusion zone on 6-ml plastic drop cloth or in plastic lined containers.

X X X X HOTLINE X X X X

CONTAMINATION REDUCTION ZONE

Remove only trackable or loose materials.

CONTAMINATION CONTROL

Remove work gloves and monitor clothing and hands.

X X X CONTAMINATION CONTROL LINE X X

SUPPORT ZONE Wash Room

Equipment: Water, soap, and towel

FIELD WASH

Thoroughly wash hands and face.
MMES Health Physics - Frisking prior to exiting regulated area.

16.4 LEVEL C DECONTAMINATION

The change in steps for Level C decontamination are contained within the Contamination Control Zone where a wash of outer gloves and boots is required prior to doffing of outer layer disposable and inner gloves and boots. A more definite plan for Level C decontamination will be revised into this SHSP, upon upgrading to Level C personnel protection.

17.0 DISPOSAL OF MATERIALS GENERATED DURING FIELD WORK

- Materials generated during field work (boring development fluids, decontamination solutions, disposable protective gear, rags, etc.) will be considered as contaminated and handled accordingly unless adequate monitoring or analytical data exists to properly classify the materials as non-hazardous.

- Materials will be segregated when collected and classified appropriately.
- The soil cutting material needs to be drummed. Specific waste analysis needs to be evaluated.
- Decontamination solution needs to be sampled before it is disposed of.
- Only drums and containers meeting the appropriate DOT, OSHA, and EPA regulations for waste contents will be used.
- DOT salvage drums and suitable quantities of absorbent will be available and used on sites where hazardous waste spills require their use.
- Vehicles and heavy equipment will not be stored in areas where spillage or leakage of materials would enter the plant's drainage system.
- Hazardous materials will be stored in contained areas designated by the Construction Engineer.
- Oil, gasoline, diesel fuel, solvents and other chemicals used on this project will not be disposed of or mixed with other waste material on the plant site.
- The Construction Engineer will be immediately notified of any spills or disposal problem, regardless of quantity, type or location of the material spilled.

18.0 EMERGENCY RESPONSE

During the site briefings held periodically, all employees will be trained and reminded of provisions of the emergency response plan, communication systems, and evacuation routes. The plan will be reviewed and revised by the SHSO on a regular basis if necessary, to ensure the plan is prevailing site conditions.

18.1 PRE-EMERGENCY PLANNING

The SHSO will perform the following pre-emergency tasks before starting field activities and will coordinate emergency response with the operating facility when appropriate:

- Locate nearest telephone and alarm stations to the site

- Confirm and post emergency telephone numbers
- Post site map marked with evacuation routes and emergency equipment and supplies
- Evaluate capabilities of local emergency response teams
- Inform emergency response representatives of nature of project hazards and potential emergencies
- Review emergency response plan for applicability to any change in site conditions, revision in scope of work, or personnel availability
- Inventory and check out site emergency equipment and supplies.

18.2 LINES OF AUTHORITY

The SHSO has primary responsibility for responding to and correcting emergency situations. The SHSO, MMES Construction Engineer and Project Engineer has the authority to stop any site activities posing an immediate health and safety hazard to site personnel and the public. Possible actions may involve notification of Project Manager, ensure corrective measures are implemented, appropriate authorities notified and follow-up reports completed (see Table E).

18.3 EMERGENCY RECOGNITION AND PREVENTION

Prevention of emergencies will be aided by the effective implementation of the health and safety procedures specified in the SHSP, and the briefings held with personnel initially and periodically reviewing site hazards and controls.

18.4 EVACUATION ROUTES/PROCEDURES

In the event of an emergency which necessitates an evacuation of the site, an alarm will be sounded or verbal instructions given for evacuation by the SHSO.

Personnel will be expected to proceed to the closest exit in pairs if possible, and mobilize to the muster area associated with the evacuation route.

The SHSO will account for personnel at the assembly point and advise responding emergency personnel of nature and location of incident. Assembly point will be designated by the MMES Construction Engineer.

In all situations in which an onsite emergency results in evacuation from the exclusion zone, personnel shall not re-enter until the conditions resulting in the emergency have been corrected, the hazards reassessed, the SHSP been reviewed with personnel briefed on any revisions and explicit instructions given for authorized re-entry.

18.5 LOCAL EMERGENCY RESPONSE NUMBERS

Emergency phone numbers should be posted at the rig. The following emergency contacts will be made by contacting the Plant Shift Supervisor or the fire department, depending on the emergency.

	<u>Number</u>	<u>Contact</u>	<u>Briefed on Operations</u>
Ambulance	574-3282	ORGRP Shift Supervisor and/or 911	Yes
Hospital	574-3282	ORGRP Shift Supervisor and/or 911	Yes
ORGRP Shift	574-3282	ORGRP Shift Supervisor and/or 911	Yes

18.6 NATIONAL EMERGENCY CONTACTS

<u>Organization</u>	<u>Telephone</u>
National Response Center	800-424-8802
Center for Disease Control	404-488-9555
Chemtrec	800-424-9555

18.7 EMERGENCY DECONTAMINATION

Personnel will be decontaminated to the extent feasible, but life saving and first aid procedures take priority over personnel decontamination efforts.

18.8 FIRE OR EXPLOSION

In the event of a fire or explosion, the local fire department should be summoned immediately. Upon their arrival, the SHSO will advise the fire commander of the location, nature and identification of the hazardous materials onsite.

If it is safe to do so, site personnel may:

- Use fire fighting equipment available onsite to control and extinguish the fire; and

18.9 SPILL OR LEAKS

In the event of a spill or leak, site personnel will:

- Inform SHSO and MMES Construction Engineer immediately
- Locate source of the spillage and stop the flow if it can be done safely; and,
- Begin containment and recovery of spilled materials

18.10 PLANT EMERGENCY SIGNALS AND ACCOUNTABILITY DRILL

Personnel will be indoctrinated to the Plant's emergency signals are and what their responsibilities are in responding to these emergency signals.

18.10.1 Radiation Alarm

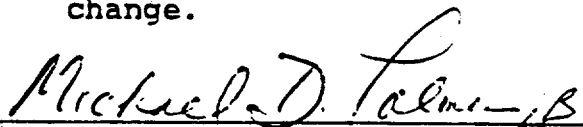
The radiation alarm occurs in an area where there are potential high radiation levels. The alarm is a clarion horn. When an alarm sounds, personnel should immediately and without delay evacuate to the assembly point designated by the Construction Engineer and maintain a minimum clearance of 400 feet from the building. Radiation alarms are in areas which could have high radiation levels due to upset or accident conditions - not normal to operations.


18.10.2 Critique of Response and Follow-up

The SHSO will evaluate the effectiveness of the emergency response and recommend procedures for improving emergency response to the SHSP approver. Follow-up activities include notification of the injured person's personnel office within 24 hours of the injury. Incidents of expected overexposure will require the notification of medical consultant and the injured's occupational physical so that they may provide assistance and relevant information to the local hospital's emergency room physician.

19.0 PLAN APPROVAL

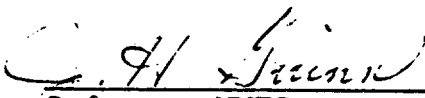
The Site Health and Safety Plan has been written for the use of ERC/Edge Group's employees on this project. ERC/Edge claims no responsibility for its use by others. The plan is written for specific site conditions, purposes, dates and personnel specified and must be amended if these conditions change.

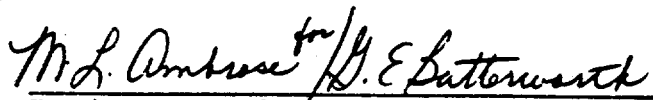

Michael D. Palmer CSP, CIH, CHMM
SHSP Originator
ERC/EDGE Project Health & Safety
Manager


Lawrence Benson
ERC/EDGE Project Manager

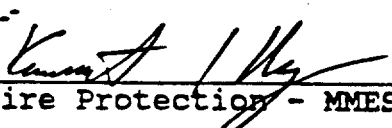

Health Physics - MMES


Industrial Hygiene - MMES


Safety - MMES


Environmental Management - MMES


Environmental Restoration - MMES


Fire Protection - MMES

20.0 SIGNATURE SHEET

I understand and will comply with the attached Site Safety and Health Plan.

Name (print)

Employer

Date

Signature

TABLE A
TASK ANALYSIS
CHEMICAL HAZARDS OF CONCERN

Task	Contaminant	PEL/TLV/STEL	Source/ Concentration Onsite	Route of Exposure	Monitoring Device
Drilling	Section 3	Section 3	Groundwater & Soil	Inhalation/ Skin Absorption Ingestion	OVA Colorimetric
Drumming Cuttings/	Section 3	Section 3	Groundwater & Soil	Inhalation/ Skin Absorption Ingestion	OVA Colori-liquid metric
Sampling	Section 3	Section 3	Groundwater & soil	Inhalation/ Skin Absorption Ingestion	OVA Colori-metric

TABLE B
TASK ANALYSIS
PHYSICAL HAZARDS OF CONCERN

Task	Hazard	Description	Prevention/Monitoring Technique
Drilling	Noise	>85 dba TWA	Ear plugs/muffs/Sound Level Meter
Material Handling	Back injury	Labor intensive tasks	Proper lifting techniques
Drilling	Radiation	Uranium Contamination	Work practices Beta-Gamma Detector
Onsite Work	Heat stress	Environmental conditioning clothing/PPE	Fluid replacement, periodic breaks
Onsite Work	Fire/Explosion	Flammable liquids, methane	Fire prevention practices, combustible gas detector
Drilling	Electrical shock	Electrical equipment	Preventive work practices

TABLE C
SITE MAP DEPICTING WORK ZONES

Table 1

ACCIDENT REPORT FORM

Start
In Out

MEDICAL-ACCIDENT REPORT

Name _____ Badge No _____ Age _____ Sex _____
(Last) (First) (Middle)

Supervisor or

Department _____ Foreman _____ Occupation _____

Date and Time of injury _____ Date and Time
of exposure occurred _____ injury or exposure reported _____

HISTORY: Where was patient at time? _____

Who witnessed the accident? _____

What was he doing? _____

What happened? _____

Was involved party ever previously affected by injury or disease? _____

What safety equipment was worn? _____

Findings: _____

X-ray: _____

Diagnosis: _____

Treatment: _____

DISPOSITION: Return to Regular Work _____ Restricted Work _____

Sent Home _____ Sent to Hospital _____

Return _____

Date of Discharge _____

Accident Report form.

Table E

ACTION LEVEL INCIDENT RESPONSE FORM

Employee _____

I. BEFORE RESPONSE

1. Incident: Site _____ City _____ State _____
a. Response Dates _____
2. Type of Response: Spill _____ Fire _____ Site _____ Train _____ Other _____
3. Incident Safety Plan: Region _____ Not Developed _____
4. Suspected chemical(s) involved: (a) _____ (b) _____
(c) _____ (d) _____
5. Protective Level(s) involved: A _____ B _____ C _____ D _____
(a) If Level C - 1. Identify Canister _____
2. Describe air monitoring source(s) _____
(b) If Level D JUSTIFY (in comments section at bottom of page).
6. SCBA-Identify Buddy: Name/Organization _____
7. Last Response: (a) Level Used: A _____ B _____ C _____ D _____
(b) Medical Attention/Exam Performed: Yes _____ No _____

II. AFTER RESPONSE

1. Protective Level Used: A _____ B _____ C _____ D _____
a. Level C - identify canister: _____ b. Level D (comment below)
c. Level B or C skin protection: Tyvek/Saran _____ Acid/Rain _____ Other _____
2. List analysis chemical exposure: Same as above: (a) _____
(b) _____ (c) _____ Unconfirmed _____
3. Equipment Decontamination: (a) clothing (b) respirator (c) monitoring
Disposed: _____
Cleaned: _____
No Action: _____
4. Approximate time in exclusion area: _____ hours per day for _____ days
5. Was medical attention/exam required for this response: Yes _____ No _____

Part I: Date Prepared: _____ Prepared By: _____

Part II: Post Analysis Date Preparation: _____ Reviewed By: _____

COMMENTS: _____

Action Level Incident Response form.